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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/815,905
Filing Date: March 31, 2004
Appellant(s): LIN ET AL.

Jeremy R. Pierce (Reg. No. #59034)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12/11/2009 appealing from the Office action mailed 7/22/2009.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,835,255	Miles	11/1998
6,020,047	Everhart	02-2000
5,730,792	Camilleti et al.	03-1998

6,335,224 Peterson et al. 1-2002

Matsumoto, Y, Shimada, T., Ishida, M., "Novel prevention method of stiction using silicon anodization of SOI structure" Sensors and Actuators, Vol A72, September 4, 1998, pp. 153-159.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 20-21, 23 and 26-28 are rejected under 35 U.S.C. 103 (a) as being unpatentable by the US Patent to Miles (5,835,255) in view of the NPL document

to Matsumoto et al "Novel prevent method of stiction using silicon anodization for SOI".

In terms of claim 20, 21, and 23 Miles discloses an interferometer modulation pixel comprising a first electrode (Fig. 28: '1004'), a movable second electrode '1004' (See Claim 1) being situated above the first electrode and being parallel to the first electrode (Figure 28: 1006); two supports (1006) between the first electrode and the second electrode to form a cavity (1004) between the first and second electrodes (1004) wherein insulator layer is present (140);

Miles does not teach a hydrophobic layer.

Matsumoto teaches a hydrophobic (pg. 154 Col 2) is being used on a cavity-side surface of the first of a substrate (See Figure 1) in this instant the hydrophobic layer will be use on a surface area (page 153 and 154). Matsumoto further discussed the application of a roughen surface (Page 154 Column 1) wherein the roughen surface (Figure 3[b]) is applied to a "mirror surface" (Figure 3 [a]) wherein the "formation of hydrophobic surface such as SAM or fluorocarbon film is one of the effective methods to prevent stictions" (page 154, Col 2).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Matsumoto with hydrophobic polymers and electrodes to make mechanical moving arm in an interferometer. Furthermore, Applicant describes the reason to apply such a layer is due to the excess of water [Disclosure: 0012]. The problem described by the applicant is known in the art as "stiction" wherein water may collect due manufacturing techniques. Matsumoto

describes the reason why "stiction" is present (page 153 last paragraph) and a method to prevent “stiction” through the application of a SAM or fluorocarbon film which displays hydrophobic properties (page 154 Col 1). Since “stiction” can be commonly found in manufacturing semiconductors devices one of ordinary skill in the art would be motivated to use the solution provided by Matsumoto to prevent "stiction" from occurring due to an excess of water.

As to claim 26-28, Miles teaches the first electrode comprises a transparent conductive layer (142), a light-absorption layer (80), and an insulating layer (140), and wherein the movable second electrode is a light-reflection electrode (506 and 502) having a hydrophobic layer prevents the first electrode from adsorbing water molecules (See Claim 20 rejection).

Claims 22 and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miles in view of Matsumoto as applied to claim 20 above, and further in view of Peterson (6,335,224)

Regarding claim 22, 24-25, Miles and Matsumoto discloses the invention of claim 20; however, Miles as modified by Matsumoto does not explicitly disclose the molecular compound of the hydrophobic organic compound comprises silanes including hexamethyl disilane.

Peterson discloses in the Abstract and correlating structures of 14 and 26 that the microelectronic device is protected by a water adsorption resistant coating that can be chosen from a list of compounds including hexamethyl disilane for the compound

exhibit the desired property of resistant to water adsorption. Furthermore, Peterson discloses the insulating layer comprises silicon nitride and the hydrophobic layer is positioned on the insulating layer (Fig. 2B '26').

It would have been obvious to one having ordinary skill in the art to recognize the teaching of Peterson would be applicable to the art of Miles and Matsumoto in modifying Miles and Matsumoto prior art. The motivation for using the compounds as claimed is obvious to one having ordinary skill in the art for it's property of resisting water adsorption and is clearly taught in Peterson's prior art that such material is used to collectively package and protect the microelectronic devices.

(10) Response to Argument

Appellant traverse the rejection of Claim 20, 21, 23, and 26-28 over Miles in view of Matsumoto in which Miles in view of Matsumoto does not provide a reasonable expectations of success (Appeal Brief - page 3 [1st Paragraph of item A]).

The examiner respectfully disagrees because the combination made using the hydrophobic layer of Matsumoto to prevent stiction (Page 154 of Matsumoto) in an optical device is shown the third reference of Peterson. The examiner would like to reference this third reference as a teaching reference because Peterson shows a coating material 14 made of SAM material (Col 5 [10-20]) applied to optically active structures (Col 5 [1-10]). Therefore SAM type materials being applied to a reflector surface will not hinder the optical operation of the device of Miles since it has been

shown to work with optical devices structures such CCD, laser diodes, VCSEL, UV erasable memory chip.

The appellant further explains that the prior art of Miles is an optical device with functional features such as modulation of light and the device of Miles provides “high resolution, full-color images" (Appeal Brief - page 3 [1st Paragraph] of item A). The appellant then asserts that the prior art of Matsumoto does not provided any reason for one of ordinary skill in the art to use either the self-assembled monolayer (“SAM’) or the fluorocarbon film in an optical device, and is silent with regard to whether such use on the reflective surfaces of an optical device would likely be successful (Appeal Brief - page 4 [Paragraph(s) 3 and 4]).

The examiner respectfully disagrees because as explained in Matsumoto the problem of stiction (Matsumoto page 153 Col 2; “Theory of Stiction”) is common in micromachining devices especially on the “surface” of the device during fabrication (Matsumoto page 153 Col 1). Since the device of Miles is a micromechanical device, it may endure problems during fabrication due to stiction therefore one of ordinary skill in art would use the solution provided by Matsumoto to combat stiction on the surface of the device if it was to occur. Further, Peterson teaches SAM type layer "14' maybe use in optical device applications (Col 5 [1-10]), and the reference submitted by the appellant to Everhart shows in Figure 3B light maybe transmitted through a SAM type material of which contains "rainbow diffraction colors" (Col 7 [60-67]. Base on the teachings of Peterson and the reference to Everhart, the examiner concluded that SAM

type layers allow light to pass through with rainbow color spectrum which will provide the combination of SAM material layer with the optical device of Miles combinable.

The appellant have submitted two references as evidence to provide support. The appellant argues that fluorocarbon polymers are opaque materials as cited in the US Patent to Camilletti (5,730,792 – US: Col 5 lines 24-47) therefore the solution of a fluorocarbon film would not be combinable with the device of Miles ((Appeal Brief - page 5 [1st Paragraph]).

The examiner's grounds of rejection to Claim 20, 21, 23, and 26-28 indicated that Matsumoto teaches a hydrophobic layer. Page 154 teaches 3 solutions of which may constitute a hydrophobic layer. The 3 solutions includes roughen surfaces, SAM (Self assembled monolayer) layer materials, and fluorocarbon film. In the final rejection dated 7/22/2009, the examiner indicated that Patent to Everhart (6,020,047) teaches that a SAM type film compatible with light transmission. Therefore even if fluorocarbon films are opaque as asserted by the appellant, the argument does not overcome the art to Matsumoto because Matsumoto indicates that SAM films maybe also be use as a hydrophobic layer (page 154 Col 2) of which is consistent with the grounds of rejection to Claim 20.

The appellant argues, that the device of Miles is not just a micromechanical device but rather a micromechanical device that heavily relied on its optical function and ability to reflect and modulate light therefore the combination of Miles in view of Matsumoto is not combinable (Appeal Brief Page 5, 2nd Paragraph).

The examiner respectfully disagrees because as shown in the teaching reference submitted by the applicant to Everhart. SAM (Self Assembled Monolayer) are capable of transmitting light (Everhart (Col 7 [60-67] and Figure 3b). Therefore if one of ordinary skill in the art uses a SAM layer on the surface of a mirror surface as shown in Figure 2a and 2b of Matsumoto as a hydrophobic layer (Matsumoto Page 154 Col 2), it would not prevent the surface of the device of Miles to reflect or transmit light because SAM type layers are able to transmit light (Everhart Col 7 [60-67] and Figure 3b) with rainbow color diffractions. Accordingly, the combination of Miles in view of Matsumoto is combinable.

The appellant argues there is simply nothing either in Miles or Matsumoto that teaches a person having ordinary skill in the art how to adjust both the transmission and reflectivity of a material upon the addition of an opaque fluorocarbon or SAM base films (Appeal Brief Page 5, 3rd Paragraph and Appeal Page 6, 1st Paragraph).

The examiner respectfully disagrees because SAM base films are not “opaque” as shown in the teaching reference to Everhart submitted by the applicant. SAM base films are capable of transmitting white light with rainbow color diffractions (See Everhart: Col 7 [60-67]). The applicant have submitted prior art to suggest that fluorocarbon films are opaque base on the reference to Camilletti, however the prior art to Matsumoto teaches two solutions of a hydrophobic layer either SAM types layer or fluorocarbon films. In this case the SAM type layer is not opaque; therefore, one of ordinary skill in the would be able to adjust the device of Miles, which can operate in low reflectivity (Col

2 [1-25]) and low light conditions (Col 2 [1-25] and Col 3 [14-25]) to work the transmissive values of the SAM layer.

The appellant further argues that SAM type layers are capable of emitting diffraction colors through white light transmission as described in Everhart (Col 7 [61-67]) therefore it would also not be obvious to combine with the device of Miles since the device of Miles provides “high resolution, full color images" (Appeal Brief - page 6 [2nd Paragraph]).

The examiner respectfully disagrees. Base on the teachings Everhart and Peterson; SAM type materials are capable of transmitting light (Everhart Figure 3b and Col 7 [60-67]). The device of Miles is capable of working in low reflectivity conditions (Col 2 [1-25], low transmissive conditions (Col 2 [1-25]) and low ambient light conditions wherein the application do not require a backlight (Col 3 lines [14-25]) due to the unique materials used by Miles. Therefore, the degree of light (as shown in Everhart Figure 3b & Col 7 [60-67]) emitted through the SAM type layer of Matsumoto would not hinder the device Miles to function properly. Further, Everhart illustrates that SAM type layers emits Rainbow color emissions (Col 7 [60-67] and Figure 3b) of which will be compatible with the device Miles because Miles only required visible spectrum colors wherein only 3 colors are needed to function properly (Col 2 [5-10]). Therefore, as long as the SAM type layer is capable of transmitting light of which is shown in the prior art of Everhart, then it would also be combinable with the device of Miles.

Appellant argues that a "SAM base material is capable of transmitting and reflecting" is misleading because it amounts to nothing more than a non sequitur. The appellant further explained that even with knowledge that a SAM would reflect and transmit light; the more important inquiry is how one of ordinary skill in the art would expect a SAM to transmit and reflect light (Appeal Brief Page 6 2nd paragraph).

The examiner respectfully disagree because the ability to transmit light and to what extent is known as provided the Appellant in the prior art of Everhart (Figure 3B and Col 7 [60-67]). Since the device of Miles only requires color from the visible spectrum and it is capable of modulating light under conditions wherein 3 colors are present (Col 2 [1-15]), one of ordinary skill in the art would use the teachings of SAM base material with hydrophobic properties to prevent stiction in an optical devices since SAM base materials are capable of transmitting white light with rainbow color diffractions.

Finally the appellant argues that Rejection to Claim 22, 24, and 25 over Miles in view of Matsumoto and Peterson do not cure the defects of the combination of Miles and Matsumoto (Appeal Brief - page 6 [Last Paragraph]).

Since the grounds of rejection of Miles in view of Matsumoto teaches the claimed invention of Claim 20, and the examiner explained why the asserted defects of Miles and Matsumoto are cured, therefore the grounds of rejection to Claim 22, 24, and 25 are maintained.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Hoang Tran/

Examiner, Art Unit 2874

/UYEN-CHAU N. LE/

Supervisory Patent Examiner, Art Unit 2874

Conferees:

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